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Combinatorial Method for the Preparation and Characterization of Libraries of Crystal-
line and Amorphous Materials on a Microgram Scale

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of German Patent Application No. 198 22 077.4 filed
5 May 16, 1998 and PCT Application No. PCT/EP99/03287 filed May 12, 1999.

FIELD OF THE INVENTION

The present invention relates to a method for the wet chemical preparation of materials
libraries consisting of a large number of solids, the solids being deposited from reaction mixtures
in microreaction chambers onto a bottom plate which simultaneously serves as the library
10 substrate.

BACKGROUND OF THE INVENTION

The narrowest bottleneck in the development of new active substances, polymers and
materials is the discovery of suitable new leading structures. In fields of organic, biochemical
and pharmaceutical chemistry, combinatorics has become established within a few years as an
15 important tool for the development of new compounds (e.g., Special issue: Combinatorial
Chemistry, Acc. Chem. Res., 1996, 29; G. Lowe, Chemical Society Reviews, 1995, 24 (5), 309;
S.R. Wilson, A.W. Czamik, Combinatorial Chemistry - Synthesis and Application, John Wiley
& Sons, 1997). In contrast, only a few examples of using a combinatorial search for materials
are known in the field of inorganic solid synthesis and materials research or technical catalyst
20 development. The preparation of materials libraries by combinatorial syntheses has been
reported for finding new superconducting materials (X.-D. Xiang et al., Science, 1995, 268,
1738), new magnetoresistant materials (G. Briceno et al., Science, 1995, 270, 273) and new
luminescent materials (E. Danielson et al., Science, 1998, 279, 837). A common feature of all
these methods is that the application of the substances as thin films by electron beam
25 vaporization or RF sputtering under reduced pressure results in the formation of a materials
library. The shape is created by a physical mask, which already resulted in libraries of as much
as 25,000 materials. The first combinatorial production of a materials library by a wet chemical